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IS 6873 (Part 2/Sec 2) : 2009 CISPR 14-2 : 1997

# भारतीय मानक

रेडियो व्यवधान लक्षणों की मापन पद्धतियाँ एवं सीमाएँ

भाग 2 विद्युत चुम्बकीय संगतता (ई एम सी) — घरेलू साधित्र, विद्युत संयंत्र और समान उपकरणों के लिये अपेक्षाएँ

अनुभाग 2 प्रतिरक्षा — पारिवारिक उत्पादों के उपयोग हेतु मानक
( दूसरा पुनरीक्षण )

# Indian Standard

# LIMITS AND METHODS OF MEASUREMENTS OF RADIO DISTURBANCE CHARACTERISTICS

PART 2 ELECTROMAGNETIC COMPATIBILITY (EMC) — REQUIREMENTS FOR HOUSEHOLD APPLIANCES, ELECTRIC TOOLS AND SIMILAR APPARATUS

Section 2 Immunity — Product Family Standard

(Second Revision)

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BUREAU OF INDIAN STANDARDS MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG NEW DELHI 110002

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#### NATIONAL FOREWORD

This Indian Standard (Part 2/Sec 2) (Second Revision) which is identical with CISPR 14-2: 1997 'Limits and methods of measurements of radio disturbance characteristics — Part 2: Electromagnetic compatibility (EMC) — Requirements for household appliances, electric tools and similar apparatus — Section 2: Immunity — Product family standard' issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on the recommendation of the Electromagnetic Compatibility Sectional Committee and approval of the Electronics and Information Technology Division Council.

This standard was originally published in 1977 and revised in 1999 based on CISPR 14:1993. This standard has been revised to align with the latest IEC Publication CISPR 14-2:1997 consolidated with Amendment No.1 in 2001. This standard deals with the electromagnetic immunity of appliances and similar apparatus for household and similar purposes that use electricity, as well as electric toy and electric tools. The limits for electromagnetic interference were earlier covered in IS 6842:1997 'Limits for electromagnetic interference — Specification' which has since been withdrawn.

The text of IEC (CISPR) Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in the Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker in the International Standard while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their respective places are listed below along with their degree of equivalence for the editions indicated:

International Standard	Corresponding Indian Standard	Degree of Equivalence
IEC 60050-161 : 1990 International Electrotechnical Vocabulary (IEV) — Chapter 161: Electromagnetic compatibility	IS 1885 (Part 85) : 2003 Electro- technical vocabulary: Part 85 Electromagnetic compatibility	Identical
IEC 61000-4-2:1995 Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 2: Electrostatic discharge immunity test	IS 14700 (Part 4/Sec 2): 2007 Electromagnetic compatibility (EMC): Part 4 Testing and measurement techniques — Section 2: Electrostatic discharge immunity test	do
IEC 61000-4-3:1995 Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 3: Radiated, radio-frequency, electromagnetic field immunity test	IS 14700 (Part 4/Sec 3): 2005 Electromagnetic compatibility (EMC): Part 4 Testing and measurement techniques, Section 3 Radiated, radio- frequency, electromagnetic field immunity test	do
IEC 61000-4-4:1995 Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques —	IS 14700 (Part 4/Sec 4): 2007 Electromagnetic compatibility (EMC): Part 4 Testing and measurement	do

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# Indian Standard

LIMITS AND METHODS OF MEASUREMENTS OF RADIO DISTURBANCE CHARACTERISTICS

PART 2 ELECTROMAGNETIC COMPATIBILITY (EMC) — REQUIREMENTS FOR HOUSEHOLD APPLIANCES, ELECTRIC TOOLS AND SIMILAR APPARATUS

Section 2 Immunity — Product Family Standard

(Second Revision)

# 1 Scope and object

**1.1** This standard deals with the electromagnetic immunity of appliances and similar apparatus for household and similar purposes that use electricity, as well as electric toys and electric tools, the rated voltage of the apparatus being not more than 250 V for single-phase apparatus to be connected to phase and neutral, and 480 V for other apparatus.

Apparatus may incorporate motors, heating elements or their combination, may contain electric or electronic circuitry, and may be powered by the mains, by transformer, by batteries, or by any other electrical power source.

Apparatus not intended for household use, but which nevertheless may require the immunity level, such as apparatus intended to be used by laymen in shops, in light industry and on farms, are within the scope of this standard, as far as they are included in CISPR 14, and in addition:

- microwave ovens for domestic use and catering;
- cooking hobs and cooking ovens, heated by means of r.f. energy,
   (single- and multiple-zone) induction cooking appliances;
- appliances for personal care equipped with radiators in the range from UV to IR, inclusive (this includes visible light).

#### **1.2** This standard does not apply to:

- equipment for lighting purposes;
- apparatus designed exclusively for heavy industrial purposes;
- apparatus intended to be part of the fixed electrical installation of buildings (such as fuses, circuit breakers, cables and switches);
- apparatus intended to be used in locations where special electromagnetic conditions prevail, such as the presence of high e.m. fields (for example in the vicinity of a broadcast transmitting station), or where high pulses occur on the power network (such as in a power generator station);
- radio and television receivers, audio and video equipment, and electronic music instruments other than toys;
- medical electrical appliances;
- personal computers and similar equipment other than toys;
- radio transmitters;
- apparatus designed to be used exclusively in vehicles;

- babies surveillance systems.
- **1.3** Immunity requirements in the frequency range 0 Hz to 400 GHz are covered.

CISPR 14-2: 1997
<b>1.4</b> The effects of electromagnetic phenomena relating to the safety of apparatus are excluded from this standard and are covered by other standards, for example IEC 60335.
Abnormal operation of the apparatus (such as simulated faults in the electric circuitry for testing purposes) is not taken into consideration.
NOTE Attention is drawn to the fact that additional requirements may be necessary for apparatus intended to be used on board ships or aircraft.
1.5 The object of this standard is to specify the immunity requirements for apparatus defined in the scope in relation to continuous and transient, conducted and radiated electromagnetic disturbances, including electrostatic discharges.

These requirements represent essential electromagnetic compatibility immunity requirements.

NOTE In special cases situations will arise where the level of disturbances may exceed the test values specified in this standard. In these instances special mitigation measure may have to be employed.

#### 2 Normative references

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The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid international standards.

IEC 60050(161):1990, International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility

IEC 61000-4-2:1995, Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test – Basic EMC publication

IEC 61000-4-3:1995, Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 3: Radiated, radio-frequency, electromagnetic field immunity test

IEC 61000-4-4:1995, Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 4: Electrical fast transient/burst immunity test – Basic EMC publication

IEC 61000-4-5:1995, Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 5: Surge immunity test

IEC 61000-4-6:1996, Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 6: Immunity to conducted disturbances, induced by radio-frequency fields

IEC 61000-4-11:1994, Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 11: Voltage dips, short interruptions and voltage variations immunity tests – Basic EMC publication

CISPR 11:1990, Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment

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	CISPR 14-1:2000, Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission
	CISPR 16-1:1993, Specification for radio disturbance and immunity measuring apparatus and methods – Part 1: Radio disturbance and immunity measuring apparatus
	CISPR 16-2:1996, Specification for radio disturbance and immunity measuring apparatus and methods – Part 2: Methods of measurement of disturbances and immunity
	3 Definitions
	Definitions related to EMC and relevant phenomena may be found in IEC 60050(161) and in

IEC and CISPR publications.

For the purposes of this standard the following particular definitions apply:

#### 3.1

# electromagnetic compatibility

the ability of a device, unit of equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment

# 3.2 port

particular interface of the specified apparatus with the external electromagnetic environment (see figure 1)

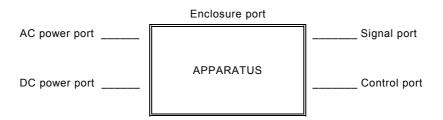


Figure 1 – Examples of ports

# 3.3

# enclosure port

the physical boundary of the apparatus through which electromagnetic fields may radiate or impinge

# 3.4

# series production

the production process in which apparatus are manufactured continuously or in batches (consisting of identical products)

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3.5 safety extra-low voltage a voltage which does not exceed 50 V a.c. or 120 V ripple free d.c. between conductors, or between any conductor and earth, in a circuit which is isolated from the supply mains by such means as a safety isolating transformer
3.6 toy product designed for, or clearly intended for use in play by children under 14 years old. Toys may incorporate motors, heating elements, electronic circuits and their combination. The supply voltage of a toy shall not exceed 24 V a.c. (r.m.s.) or ripple-free d.c. and may be provided by a battery or by means of an adapter or a safety transformer connected to the mains supply.  NOTE Transformers, converters and chargers for toys are considered not to be part of the toy (see IEC 61558-2-7).
3.7 electric toy toy having at least one function dependent on electricity
3.8 battery toy toy which contains or uses one or more batteries as the only source of electrical energy
3.9 transformer toy toy which is connected to the supply mains through a transformer for toys and using the supply mains as the only source of electrical energy
3.10 dual supply toy toy which can be operated simultaneously or alternatively as a battery toy and a transformer toy
3.11 safety isolating transformer transformer, the input winding of which is electrically separated from the output winding by an insulation at least equivalent to double insulation or reinforced insulation, and which is designed to supply an appliance or circuit at safety extra-low voltage
3.12 safety transformer for toys safety isolating transformer specially designed to supply toys operating at safety extra-low voltage not exceeding 24 V  NOTE Either a.c. or d.c. or both may be delivered from the transformer unit.

3.13

# constructional kit

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collection of electric, electronic or mechanical parts intended to be assembled as various toys

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3.14
experimental kit
collection of electric or electronic components intended to be assembled in various combinations
NOTE The main aim of an experimental set is to facilitate the acquiring of knowledge by experiment and research.
It is not intended to create a toy or equipment for practical use.
3.15
functional toy toy with a rated voltage not exceeding 24 V and which is a model of an appliance or installation used by adults
NOTE A product with a rated voltage exceeding 24 V, intended to be used by children under the direct supervision of an adult and which is a model of an appliance or installation and used in the same way, is known as a functional product.
0.40
3.16 video toy
toy consisting of a screen and activating means by which the child can play and interact with the picture shown on the screen
NOTE All parts necessary for the operation of the video toy, such as control box, joy stick, key board, monitor and connections, are considered to be part of the toy.
3.17
normal operation of toys
condition under which the toy, connected to the recommended power supply, is played with as
intended or in a foreseeable way, bearing in mind the normal behaviour of children
4 Classification of apparatus
The apparatus covered by this standard is subdivided into categories. For each category, specific requirements are formulated.
4.4 Cotogony ly apparatus containing no electronic control circuity.
4.1 Category I: apparatus containing no electronic control circuitry.
Examples: motor operated appliances, lighting toys, track sets without electronic control units,
tools, heating appliances, UV and IR radiators and apparatus containing components such as
electromechanical switches and thermostats.
Electric circuits consisting of passive components (such as radio interference suppression
capacitors or inductors, mains transformers and mains frequency rectifiers) are <u>not</u> considered
to be electronic control circuitry.
<b>4.2</b> Category II: transformer toys, dual supply toys, mains powered motor operated appliances.
<b>4.2</b> Category II: transformer toys, dual supply toys, mains powered motor operated appliances, tools, heating appliances and similar electric apparatus (for example – UV radiators, IR radiators
and microwave ovens) containing electronic control circuitry with no internal clock frequency or
oscillator frequency higher than 15 MHz.

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NOTE 1 The value 15 MHz is tentative and may be modified after a period of experience.

NOTE 2 For toys, examples include educational computers, organs, track sets with electronic control units.

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4.3 Category III: battery powered apparatus (with built-in batteries or external batteries),
which in normal use is not connected to the mains, containing an electronic control circuitry
with no internal clock frequency or oscillator frequency higher than 15 MHz.
This category includes apparatus provided with rechargeable batteries which can be charged
by connecting the apparatus to the mains power. However, this apparatus shall also be tested
as an apparatus in category II while it is connected to the mains network.
NOTE For toys, examples include musical soft toys, cord-controlled toys and motor-operated electronic toys.
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<b>4.4</b> Category IV: all other apparatus covered by the scope of this standard.

#### 5 Tests

# 5.1 Electrostatic discharge

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Electrostatic discharge tests are carried out according to basic standard IEC 61000-4-2, with test signals and conditions as given in table 1.

Table 1 - Enclosure port

Environmental phenomenon	Test specification	Test set-up
Electrostatic discharge	8 kV air discharge 4 kV contact discharge	IEC 61000-4-2
NOTE. The 4 kV contact discharge shall be applied to conductive accessible parts. Metallic contacts, such as in		

NOTE The 4 kV contact discharge shall be applied to conductive accessible parts. Metallic contacts, such as in battery compartments or in socket outlets, are excluded from this requirement.

Contact discharge is the preferred test method. 20 discharges (10 with positive and 10 with negative polarity) shall be applied on each accessible metal part of the enclosure. In case of a non-conductive enclosure, discharges shall be applied on the horizontal or vertical coupling planes as specified in IEC 61000-4-2. Air discharges shall be used where contact discharges cannot be applied. Tests with other (lower) voltages than those given in table 1 are not required.

## 5.2 Fast transients

Fast transient tests are carried out according to basic standard IEC 61000-4-4, for 2 minutes with a positive polarity and for 2 minutes with a negative polarity, according to the following tables 2, 3 and 4.

Table 2 - Ports for signal lines and control lines

Environmental phenomenon	Test specifications	Test set-up
Fast transients common mode	0,5 kV (peak) 5/50 ns $T_{\rm r}/T_{\rm d}$ 5 kHz repetition frequency	IEC 61000-4-4
NOTE Applicable only to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification		

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# Table 3 - Input and output d.c. power ports

Environmental phenomenon	Test specifications	Test set-up
Fast transients common mode	0,5 kV (peak) 5/50 ns $T_r/T_d$ 5 kHz repetition frequency	IEC 61000-4-4
NOTE Not applicable to battery operated appliances that cannot be connected to the mains while in use.		

A coupling/decoupling network shall be applied for testing d.c. power ports.

Table 4 - Input and output a.c. power ports

Environmental phenomenon	Test specifications	Test set-up
Fast transients common mode	1 kV (peak) 5/50 ns $T_{\rm r}/T_{\rm d}$ 5 kHz repetition frequency	IEC 61000-4-4
For extra low voltage a c ports, this testing is only applicable to ports interfacing with cables whose total length		

For extra low voltage a.c ports, this testing is only applicable to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification.

A coupling/decoupling network shall be applied for testing a.c. power ports.

# 5.3 Injected currents, 0,15 MHz to 230 MHz

Injected current tests are carried out according to the basic standard IEC 61000-4-6, and according to the following tables 5, 6 and 7.

Test conditions and testing arrangements, especially for measurements from 80 MHz to 230 MHz, shall be clearly specified in the test report.

NOTE Current injection up to 230 MHz is applied, independent of the dimensions of the equipment under test (EUT).

The unmodulated carrier of the test signal is adjusted to the indicated test value. To perform the test, the carrier is in addition modulated as specified.

Table 5 – Ports for signal lines and control lines

Environmental phenomenon	Test specifications	Test set-up
RF current common mode 1 kHz, 80 % AM	0,15 MHz to 230 MHz 1 V (r.m.s.) (unmodulated) 150 Ω source impedance	IEC 61000-4-6
NOTE Applicable only to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification.		

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specification.

Table 6 - Input and output d.c. power ports

Environmental phenomenon	Test specifications	Test set-up
RF current common mode 1 kHz, 80 % AM	., .	
NOTE 1 Not applicable to battery open	erated appliances that cannot be connec	ted to the mains while in use.
	ted appliances that can be connected i.c. cables may exceed 3 m according	

A coupling/decoupling network shall be applied for testing d.c. power ports

Table 7 - Input and output a.c. power ports

Environmental phenomenon	Test specifications	Test set-up
RF current common mode 1 kHz, 80 % AM	0,15 MHz to 230 MHz 3 V (r.m.s.) (unmodulated) 150 Ω source impedance	IEC 61000-4-6
For extra low voltage a.c ports, this testing is only applicable to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification.		

A coupling/decoupling network shall be applied for testing a.c. power ports.

# 5.4 Injected currents, 0,15 MHz to 80 MHz

Injected current tests are carried out according to the basic standard IEC 61000-4-6, and according to the following tables 8, 9 and 10.

The unmodulated carrier of the test signal is adjusted to the indicated test value. To perform the test, the carrier is in addition modulated as specified.

Table 8 - Ports for signal lines and control lines

Environmental phenomenon	Test specifications	Test set-up
RF current common mode 1 kHz, 80 % AM	0,15 MHz to 80 MHz 1 V (r.m.s.) (unmodulated) 150 Ω source impedance	IEC 61000-4-6

NOTE Applicable only to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification.

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# Table 9 - Input and output d.c. power ports

Environmental phenomenon	Test specifications	Test set-up
RF current common mode 1 kHz, 80 % AM	0,15 MHz to 80 MHz 1 V (r.m.s.) (unmodulated) 150 Ω source impedance	IEC 61000-4-6
NOTE Not applicable to battery opera	ted appliances that cannot be connected	d to the mains while in use.

☐ A coupling/decoupling network shall be applied for testing d.c. power ports.

Table 10 - Input and output a.c. power ports

Environmental phenomenon	Test specifications	Test set-up
RF current common mode 1 kHz, 80 % AM	0,15 MHz to 80 MHz 3 V (r.m.s.) (unmodulated) 150 Ω source impedance	IEC 61000-4-6

For extra low voltage a.c ports, this testing is only applicable to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification.

A coupling/decoupling network shall be applied for testing a.c. power ports.

# 5.5 Radio frequency electromagnetic fields, 80 MHz to 1000 MHz

Radio frequency electromagnetic field tests are carried out according to basic standard IEC 61000-4-3, and according to table 11.

The unmodulated carrier of the test signal is adjusted to the indicated test value. To perform the test, the carrier is in addition modulated as specified.

Table 11 - Enclosure port

Environmental phenomenon	Test specifications	Test set-up
	80 MHz to 1 000 MHz 3 V/m (r.m.s.) (unmodulated)	IEC 61000-4-3

# 5.6 Surges

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Surge immunity tests are carried out according to basic standard IEC 61000-4-5, and according to table 12.

Table 12 - Input a.c. power ports

Environmental phenomenon	Test specifications	Test set-up
Surge	1,2/50 (8/20) T <sub>r</sub> /T <sub>d</sub> μs	IEC 61000-4-5
	2 kV	
	1 kV	

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	CISPR 14-2: 1997
	Five positive and five negative pulses shall be applied as far as applicable, successively:
	<ul><li>between phase and phase: 1 kV;</li></ul>
	<ul><li>between phase and neutral: 1 kV;</li></ul>
	<ul> <li>between phase and protective earth: 2 kV;</li> </ul>
	<ul> <li>and between neutral and protective earth: 2 kV.</li> </ul>
	Tests with other (lower) voltages than those given in table 12 are not required.
_	5.7 Voltage dips and interruptions

Tests concerning voltage dips and interruptions are carried out according to basic standard IEC 61000-4-11, and according to the following table 13.

**Environmental** Test level **Duration** (in periods Test set-up phenomena in % *U*<sub>⊤</sub> of the rated frequency) Interruptions 0 0.5 IEC 61000-4-11 Voltage dips 40 10 Voltage shift shall occur at zero crossing 70 in % *U*<sub>⊤</sub> 30 50  $U_{\tau}$  is the rated voltage for the equipment.

Table 13 - Input a.c. power ports

#### 6 Performance criteria

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A functional description and a definition of performance criteria, during or as a consequence of the EMC testing, shall be provided by the manufacturer and noted in the test report, based on the following criteria.

Performance criterion A: The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

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☐ The following table 14 serves as a guide to formulate the permissible degradation of the equipment under test (EUT) caused by electromagnetic stress. Not all functions of the apparatus need to be tested. The selection, the specification of functions, and the permissible degradation is left to the responsibility of the manufacturer.

Table 14 - Examples of degradations

Functions		Criteria			
(non-exhaustive)	Α	<b>B</b> <sup>2)</sup>	C1 <sup>3)</sup>	C2 <sup>3)</sup>	
Motor speed	10 % 1)	_	+	_	
Torque	10 % 1)	_	+	_	
Movement	10 % 1)	_	+	_	
Power (consumption, input)	10 % 1)	-	+	_	
Switching (change of state)	_	_	+	_	
Heating	10 % 1)	_	+	_	
Timing (programme, delay, duty cycle)	10 % 1)	_	+	_	
Stand-by	-	_	4)	_	
Data storage	_	_	5)	5)	
Sensor functions (signal transmission)	6)	_	7)	_	
Indicators (visual and acoustic)	6)	_	7)	_	
Audio function	6)	_	7)	_	
Illumination	6)	_	7)	_	

- No change allowed.
- Change allowed.

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- 1) Values are exclusive of the measurement accuracy.
- <sup>2)</sup> For criterion B, measurement or verification is performed during the stable operations of the Equipment Under Test before and after the application of the specified phenomenon.
- 3) For criterion C, distinction is made between
  - C1: before resetting and
  - C2: after resetting.
- 4) Switching-off is allowed, switching-on is not allowed.
- 5) Loss or change of data is allowed.
- 6) Lower performance as specified by the manufacturer is allowed, but no loss of correct function.
- Loss of correct functions allowed.

# Applicability of immunity tests

#### 7.1 General

7.1.1 The immunity tests for apparatus covered by this standard are given in clause 5 on a port by port basis. The tests are specified for each port concerned.

Tests are applied to the relevant ports of the apparatus according to tables 1 to 13.

Tests shall be carried out on those ports which are accessible during normal operation of the equipment.

The tests shall be carried out as single tests in sequence. The sequence of testing is optional.

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The description of the test, the test generator, the test methods, and the test set-up are given in basic standards which are referred to in the tables. The content of these basic standards are not repeated here; however, modifications or additional information needed for the practical application of the tests are given in this standard.
<b>7.1.2</b> It may be determined from consideration of the electrical characteristics and usage of a particular apparatus that some of the tests are inappropriate, and therefore unnecessary. In such cases it is required that the decision not to test be recorded in the test report.
<b>7.1.3</b> Regardless of their category, experimental kits intended for education and play are deemed to fulfil the immunity requirements, and are not tested.

# 7.2 Application of tests for the different categories of apparatus

# 7.2.1 Category I

Category I apparatus is deemed to fulfil the relevant immunity requirements without testing.

# 7.2.2 Category II

Category II apparatus shall fulfil the following requirements:

- electrostatic discharge with performance criterion B (5.1);
- fast transients with performance criterion B (5.2);
- injected currents up to 230 MHz with performance criterion A (5.3);
- surges with performance criterion B (5.6);
- voltage dips and interruptions with performance criterion C (5.7).

# 7.2.3 Category III

Category III apparatus shall fulfil the following requirements:

- electrostatic discharge with performance criterion B (5.1);
  - A performance criterion C could be applied to toys not using score or data entered by the user. Examples are musical soft toys, sounding toys, etc.
- radio frequency electromagnetic fields, with performance criterion A.

This test is only applicable to the ride on toys operating with electronic devices.

# 7.2.4 Category IV

Category IV apparatus shall fulfil the following requirements:

- electrostatic discharge with performance criterion B (5.1);
- fast transients with performance criterion B (5.2);

- injected currents up to 80 MHz with performance criterion A (5.4);
- radiofrequency EM fields with performance criterion A (5.5);
- surges with performance criterion B (5.6);
- voltage dips and interruptions with performance criterion C (5.7).

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8 Conditions during testing
<b>8.1</b> The tests shall be made in the specified frequency band, while the apparatus is operated as intended in the most susceptible operating mode, as described by the manufacturer, consistent with usual operation.
Tests shall be carried out under the conditions specified in CISPR 14 where applicable. The tests shall be carried out within the specified or typical environmental range for the apparatus, and at its rated supply voltage and frequency. If the apparatus can be set at different levels (for example speed, temperature), a setting below maximum shall be used, preferably at approximately 50 % level.

During the tests, toys are operated under normal operation. Transformer toys are tested with the transformer supplied with the toy. If the toy is supplied without a transformer, it shall be tested with an appropriate transformer.

Microwave ovens, cooking ovens, hobs and induction cooking appliances shall be tested,

loaded with 1 l ± 0,5 l tapwater; long lasting tests may be interrupted to refill the load.

In case of associated devices (for example, video toy cartridges) sold separately to be used with different appliances, the associated device shall be tested with at least one appropriate representative hosting appliance, selected by the manufacturer of the associated device, in order to check conformity of the associated device for all appliances with which it is intended to operate. The hosting appliance shall be representative of series produced appliances and shall be typical.

However, the manufacturer's specification of test configuration, conditions and performances takes precedence.

- **8.2** Where applicable, the configuration of the EUT shall be varied to achieve maximum susceptibility. If the apparatus can be connected to auxiliary apparatus, then the apparatus shall be tested while connected to the minimum configuration of auxiliary apparatus necessary to exercise all existing ports.
- **8.3** The tests concerning ESD, transients, surges and voltage interruptions are carried out during each mode of operation of the EUT (or phase as part of the mode of operation) selected for the test.
- **8.4** The tests concerning e.m. fields and current injection are carried out during the scan time while, at random, the selected modes of the EUT are set into operation. In addition, tests are performed at five selected spot frequencies, each for up to 3 min at the selected modes of operation.
- **8.5** For manual selection of the mode of operation, the test may be interrupted, or care should be taken that the operator does not influence the test results.
- **8.6** In case of an EUT with an automatic cycling programme, the scan time shall be started at random. Where a single cycle lasts longer than the scan time, the test shall be repeated until the cycle is finished.
- **8.7** Service programmes shall be tested if they are user accessible.

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	CISPR 14-2: 1997
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	<b>8.8</b> The configuration and mode of operation during the tests shall be precisely noted in the test report.
	NOTE Care should be taken that changes in the environment, such as power supply, do not influence the test results.
	9 Assessment of conformity
	9.1 Single product evaluation
	Apparatus manufactured in series production shall be verified by performing a type-test on one

The manufacturer's or supplier's quality system shall ensure that the tested model or apparatus is representative of the series-produced apparatus concerned.

representative model, or on one series-produced apparatus.

4

For apparatus not produced in series, the test procedures shall ensure that each individual apparatus meets the requirements when tested by the methods specified.

Results obtained for an apparatus tested when installed in its place of use (and not on a test site) relates to that installation only, and shall not be considered representative for any other installation.

#### 9.2 Statistical evaluation

IS 6873 (Part 2/Sec 2) : 2000

The significance of the requirements for compliance of the apparatus with the standard shall be that, on a statistical basis, at least 80 % of the series produced apparatus complies with the requirements with at least 80 % confidence.

When type-testing is carried out on a single piece of apparatus, compliance with the requirements on the 80 %/80 % basis is not guaranteed.

Compliance is judged from the condition that the number of apparatus which do not fulfil the requirements may not exceed c in a sample of size n.

n	7	14	20	26	32
С	0	1	2	3	4

If the tests on the sample result in non-compliance with the requirements, then a second sample may be tested, and the results combined with those from the first sample. Compliance is then checked for the combined sample.

NOTE For general information, see Section Nine of CISPR 16, Statistical consideration in the determination of limits of radio interference.

CISPR 14-2: 1997

9.3 In case of dispute
In case of dispute, assessment of conformity with this standard shall be based on the statistical method of evaluation.

10 Product documentation

The specification prepared by the manufacturer, for the acceptable level of EMC performance, or degradation of EMC performance during or after the testing required by this standard, shall

□ be made available upon request.

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IS 6873 (Part 2/Sec 2): 2009

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Bibliography
IEC 61558-2-7, Safety of power transformers, power supply units and similar – Part 2-7:
Particular requirements for transformers for toys
CISPR 16-2:1996, Specification for radio disturbance and immunity measuring apparatus and
methods – Part 2: Methods of measurement of disturbances and immunity

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# (Continued from second cover)

International Standard	Corresponding Indian Standard	Degree of Equivalence
Section 4: Electrical fast transient/ burst immunity test	techniques, Section 4 Electrical fast transient/burst immunity test	
IEC 14700-4-11 : 1994 Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 11: Voltage dips, short interruptions and voltage variations immunity tests	IS 14700 (Part 4/Sec 11): 2008 Electromagnetic compatibility (EMC): Part 4 Testing and measurement techniques, Section 11 Voltage dips, short interruptions and voltage variations immunity test	Identical
CISPR 14-1: 2000 Electromagnetic compatibility — Requirements for household appliances, electric tools and similar apparatus — Part 1: Emission	IS 6873 (Part 2/Sec 1): 2009 Limits and methods of measurements of radio disturbance characteristics: Part 2 Electromagnetic compatibility (EMC) — Requirements for household appliances, electric tools and similar apparatus, Section 1 Emission (second revision)	do
CISPR 16-1: 1993 Specification for radio disturbance and immunity measuring apparatus and methods—Part 1: Radio disturbance and immunity measuring apparatus	IS 10052 (Part 1): 1999 Specification for radio disturbance and immunity measuring apparatus and methods: Part 1 Radio disturbance and immunity measuring apparatus (first revision)	do
CISPR 16-2: 1996 Specification for radio disturbance and immunity measuring apparatus and methods — Part 2: Methods of measurement of disturbances and immunity	IS 10052 (Part 2): 1999 Specification for radio disturbance and immunity measuring apparatus and methods: Part 2 Methods of measurement of disturbances and immunity (first revision)	do

The technical committee responsible for the preparation of this standard has reviewed the provisions of the following International Standards and has decided that they are acceptable for use in conjunction with this standard:

International Standard	Title
IEC 61000-4-5 : 1995	Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 5: Surge immunity test
IEC 61000-4-6 : 1996	Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 6: Immunity to conducted disturbances, induced by radio-frequency fields

Only the English language text in the International Standard has been retained while adopting it in this Indian Standard, and as such the page numbers given here are not the same as in the IEC Standard.

For the purpose of deciding whether a particular requirements of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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#### **Amendments Issued Since Publication**

Amend No.	Date of Issue	Text Affected

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# Headquarters:

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